

MONITORING POST-FLEDGING BURROWING OWLS IN SOUTHWESTERN IDAHO



by James R. Belthoff,
Andrew R. King,
John Doremus,
and Troy Smith

**MONITORING POST-FLEDGING BURROWING OWLS
IN SOUTHWESTERN IDAHO**

James R. Belthoff and R. Andrew King
Department of Biology and
Raptor Research Center
Boise State University
Boise, Idaho 83725

John Doremus
U.S. Bureau of Land Management
3948 Development Avenue
Boise, Idaho 83705

and

Troy Smith
Department of Wildlife Resources
University of Idaho
Moscow, Idaho 83843

A Cooperative Project Between Boise State University
and the Idaho Bureau of Land Management

January 1995



A western burrowing owl (*Speotyto cunicularia hypugaea*) equipped with a radio-transmitter package and colored leg bands

TABLE OF CONTENTS

	<u>Page</u>
FRONTISPIECE	i
TABLE OF CONTENTS	ii
PROJECT SUMMARY	1
INTRODUCTION	2
METHODS	2
Study Area	2
Locating and Capturing Burrowing Owls	3
Owl Monitoring	3
Nesting Habitat	4
Data Analysis	5
RESULTS	5
Trapping and Banding	5
Nest Site Habitat	5
Breeding Season Behavior	7
Fall Migration	9
Mortality Factors and Survival Rates	9
SUMMARY AND CONCLUSIONS	10
ACKNOWLEDGMENTS	14
LITERATURE CITED	14
FIGURES	17
Figure 1	17
Figure 2	18
Figure 3	19
Figure 4	20
Figure 5	21
Figure 6	22
TABLES	23
Table 1	23
Table 2	24
Table 3	25
Table 4	26
Table 5	27
Table 6	28
Table 7	29

APPENDIX A: *Banding Data*

APPENDIX B: *Nest Habitat Data*

PROJECT SUMMARY

Our study was designed to monitor the post-fledging behavior of burrowing owls (*Speotyto cunicularia*) in southwestern Idaho. During the 1994 breeding season, we captured and banded 71 burrowing owls. A subset of owls was fitted with radio-transmitters so that they could be tracked during the pre-fledging, post-fledging, dispersal, and pre-migratory periods. Nesting occurred during April, May and June. During this time, adult female burrowing owls incubated and brooded young, while adult males hunted, provided prey to the female and nestlings, and remained vigilant for predators. Nests were placed mainly in abandoned badger (*Taxidea taxus*) burrows. Nests were in areas dominated by cheatgrass brome (*Bromus tectorum*), tumble mustards (*Sisymbrium* spp.), and some big sagebrush (*Artemisia tridentata*). Burrow availability did not appear to be limited on the study area. Nests that successfully fledged young ($N = 8$) had lower vegetation surrounding them than those that were unsuccessful ($N = 6$), but the difference only approached significance. None of the other habitat parameters examined differed significantly between successful and unsuccessful nests, although the sample sizes based on our one-year study are probably too small to detect differences if they in fact existed.

Young burrowing owls appeared at the entrance to their natal burrows when approximately 10 - 12 days of age, beginning in May and early June. Beginning around 21 days of age, many young owls left their natal burrows and began to use satellite burrows within their parents' home range. The first satellite burrows used by owls in the 8 families that successfully fledged young were an average of 28.9 m from the natal burrow. Post-fledging dispersal, which we defined as permanent movements > 300 m away from the natal area, occurred between late-July and early October, when young owls were an average of 88 days old. Radio-tagged burrowing owls ($N = 15$) dispersed an average of 1.4 km from natal burrows prior to initiating fall migration, but this average is probably low because we lost track of several long distance dispersers. The mean dispersal direction was $153.8^\circ \pm 74.7^\circ$, but the movements were uniformly distributed in all directions. Siblings dispersed together (i.e., as a group) in some families, while in others they moved in different directions. Open grasslands were important habitats during both the pre-fledging and post-fledging periods. Burrowing owls increased their use of dense sagebrush habitat during the post-fledging and dispersal periods; this habitat was rarely occupied during the day during the pre-fledging period.

Fall migration appeared to be initiated during the period from mid-September through mid-October, although some individuals with which we lost contact may have migrated earlier. The last two radio-tagged owls (2 adult males) left the study area on 18 October. Thus, it appears that burrowing owls breeding in southwestern Idaho are migratory, and they leave the study area by mid-October. There is no information on where individuals from this breeding population spend the winter months.

Important mortality factors affecting both young and adults included predation by skunks (*Mephitis mephitis*) and other unidentified mammalian predators, shooting by humans, collisions with automobiles (road kills), entanglement with barbed wire fences, starvation, and cannibalism. During the pre-fledging period, juveniles experienced a survival rate of 77%, while only 1 of 26 adults failed to survive. During the post-fledging period, juveniles experienced a 92% survival rate, and no adults suffered mortality at this time.

INTRODUCTION

Burrowing owl (*Speotyto cunicularia*) populations are declining throughout much of their range (Haug et al. 1993). These declines have been attributed to control measures aimed at burrowing mammals, loss of habitat to cultivation and other land use activities, predation, and persecution by humans (Collins 1979, Rich 1986). Because of population declines, resource agencies in both the United States and Canada have listed burrowing owls among the species in need of management or special attention. Burrowing owls are listed as *endangered* in Manitoba, Iowa, and Minnesota, as *threatened* in Saskatchewan, Alberta, and British Columbia, and as a *species of special concern* in a number of western states (CA, MT, ND, OR, WA, WY) and in Florida. Idaho Fish and Game has not listed this species, but the U.S.D.I. Bureau of Land Management considers burrowing owls as a *sensitive* species in Idaho (Moseley and Groves 1992).

Several aspects of the biology of burrowing owls are well documented. These include burrowing owl food habits (e.g., Maser et al. 1971, Marti 1974, Gleason and Craig 1979, Schlatter et al. 1980, Brown et al. 1986, Green et al. 1993, Plumpton and Lutz 1993a) and nesting requirements (e.g., Gleason and Johnson 1985, MacCracken et al. 1985, Rich 1986, Green and Anthony 1989, Plumpton and Lutz 1993b). These studies indicate that burrowing owls require areas with short grass or shrubs, open sites, and the availability of below-ground burrows for nesting. Previous studies also indicate that burrowing owls feed on both vertebrate (mainly rodents) and invertebrate (mainly beetles) prey during the breeding season. In contrast, relatively little is known about the post-fledging behavior of burrowing owls (Haug et al. 1993). Because increasing recruitment of young into breeding populations may likely to be a major focus in reversing population declines, it is imperative that factors contributing to post-fledging behavior, dispersal, and survival of young burrowing owls be understood.

Our study was designed to monitor both young and adult burrowing owls to provide: (1) information on the post-fledging behavior of burrowing owls in southwestern Idaho, (2) an indication of the habitat variables important to burrowing owls during the post-fledging period, (3) an indication of the mortality factors operating during the nesting and post-fledging periods, and (4) information on the timing and distance of dispersal movements made by juvenile owls. Information from this study will hopefully be useful in formulating management strategies for this species throughout its range. This report summarizes our activities and data collected during the spring, summer, and fall of 1994.

METHODS

Study Area

We studied burrowing owls nesting singly and in loose colonies on federal (Bureau of Land Management) land near Kuna Butte, located approximately 3.2 km

south of Kuna, in Ada County, Idaho (Fig. 1). The area is characterized by big sagebrush (*Artemisia tridentata*) shrubland, and grasslands dominated by cheatgrass brome (*Bromus tectorum*) in disturbed areas (Fig. 2a and 2b). Surrounding areas contain cultivated agricultural fields (primarily hay and wheat), scattered residential homes, and a large dairy farm. The topography of the area is flat to slightly rolling with a few isolated buttes and rock outcroppings.

Locating and Capturing Burrowing Owls

We searched suitable habitat for burrowing owls both on foot and from automobiles. Although many surveys were performed during late afternoon and early evening, we surveyed throughout all hours of the day and night. Frequently, we played a tape-recorded burrowing owl call (Haug and Didiuk 1993) over a loudspeaker (Johnny Stewart® Game & Animal Caller) to which owls responded with vocalizations. This helped identify the location of nesting owls. After locating owls, we monitored their nesting activities on a regular basis.

To capture owls we used bal-chatri traps, noose carpets or noose rods, Havahart® traps, Tomahawk® live traps, and Sherman® live traps placed at or near burrow entrances (Ferguson and Jorgensen 1981, Plumpton and Lutz 1992, Winchell and Turman 1992). Occasionally we placed bal-chatri traps within sight of roosting or hunting owls as we passed by in a vehicle. We also designed and constructed a trap that used a see-through, 1-way Plexiglas door placed within a PVC tube. The tube was inserted into burrow entrances. Young owls were able to leave their burrow through the 1-way door and were retained in a wire basket, but they were prevented from returning to the burrow by the door.

Upon capture, we recorded each owl's mass (to nearest 0.5 g), wing length, tarsus length, tail length, and length of exposed culmen (all to nearest 0.5 mm). We classified adult owls as females if they had well-developed brood patches. We were unable to discern gender of young owls based on appearance or morphological measurements. We fitted owls with a U.S. Fish and Wildlife Service aluminum leg band and three plastic, colored leg bands (National Band and Tag Co., Newport, KY) for future identification. Each owl included in the radio-telemetry study received a radio transmitter package (Wildlife Materials, Inc., Carbondale, IL), which was attached backpack style with woven nylon cord. Transmitters weighed 4 g and were designed to function for 4-5 months, which spanned both the post-fledging and dispersal periods.

Owl Monitoring

Radio-tagged and color-marked adults and juveniles were located daily using hand-held telemetry receivers and antennas. Each day we recorded the following variables concerning the diurnal locations of owls: habitat surrounding each owl's daytime roost (classified as open grassland, grasslands with sagebrush, dense sagebrush, rocky area, agricultural field, and roadway/fencerow), location of roost,

type of perch, distance from natal burrow, distance from previous day's roost, distance between adults and young in a family group, and distance among young in a brood. We made these observations for the duration of the post-fledging period and up until the time when young dispersed from natal areas.

We located dispersing juveniles by searching near the natal area on foot using hand-held receivers and antennae. When ground searches did not locate dispersing juveniles, the study area was searched by a fixed-wing airplane equipped for radio-telemetry. After determining general locations of owls from the air, we determined specific locations of owls from the ground. We defined post-fledging dispersal as a permanent movement away from natal areas prior to fall migration. This typically coincided with a distance >300 m from the natal burrow. Thus, we considered a juvenile owl to have "dispersed" or left the natal area when it moved farther than 300 m from the natal burrow and did not return to the natal area.

Effects of Food Abundance on Post-fledging Dispersal Movements. — In conjunction with our radio-telemetry study, we conducted an experiment that varied the food availability for owls in some families. Two families of burrowing owls (identified as Dairy #2 and Kuna Butte #3) received supplemental feedings of mice and day-old chickens (≈ 111 g/family/day) to increase the amount of food to which they had access. Provisioning was intended as a supplement to, and not a substitute for, a normal diet. Our objective was to assess the prediction that supplemented juveniles will disperse sooner than those which are not supplementally fed. For example, if some juveniles are given a supply of "extra" food, they may grow and mature more quickly than those which are not supplementally fed. These juveniles could achieve independence at an earlier age and disperse from natal areas sooner. A contrasting prediction is that when juveniles have easy access to a reliable and sufficient food source there would be no urgent need to disperse from the natal area, and perhaps no need to disperse at all. Thus, supplemental food may instead delay post-fledging dispersal movements.

Nesting Habitat

Physical attributes of the nest burrow and surrounding vegetation were recorded for each burrowing owl nesting attempt on the study area. For each nest burrow we measured the diameter of the entrance, compass orientation of entrance, height of mound, distance to nearest burrow, distance to nearest occupied burrow, number of burrows within a 10 m radius, distance to first satellite burrow, vegetation height at burrow and within a 2 m radius, dominant plant species, vegetation type, distance to nearest perch, type of perch, height of perch, distance to nearest agricultural field, distance to nearest paved/gravel road, and the distance to the nearest source of water.